

CLAIMS

- Sub
M
1. Method for manufacturing smart cards, the said smart card comprising an antenna (11) the ends of which are provided with connection pads (12) for connection to an electronic module, characterised in that the method comprises at least one stage consisting in producing the antenna (11) comprising at least two turns, on a support sheet (10), said antenna having its turns located outside the connection pads (12), and an insulating bridge (13) so as to connect each of the ends of the antenna to a connection pad respectively.
 2. Manufacturing method according to Claim 1, characterised in that the insulating bridge (13) is produced by covering the turns of the antenna (11) with an insulating layer (14) in one zone (Z), then by depositing on this insulating layer a conductive element (15) so that one outer end of the antenna can be connected to one connection pad (12).
 3. Manufacturing method according to Claim 1, characterised in that, in order to produce the insulating bridge (13), the antenna (11) is formed on each side of the support sheet (10), the connection pads (12) being formed on the same side of the support sheet.
 4. Manufacturing method according to one of the preceding claims, characterised in that it consists additionally in:
 - assembling the support sheet (10) to plastic foils (20, 30, 40, 50) to form a card body,
 - machining a cavity (61) and connection recesses (62) in an upper face of the card body, the machining plane of the cavity (61) being situated below the plane of the connection pads (12) of the antenna (11), and the connection recesses (62) being situated above the connection pads (12) of the antenna in order to expose them,
 - fixing an electronic module (M) into the cavity (61), the module having on its lower side, facing towards the inside of the cavity, conductive

Cont.
Sub
A1

pads (72) in electrical contact with the connection pads (12) of the antenna by means of a conductive linking element (66) located in the connection recesses (62).

5. Method of manufacturing a smart card, the said smart card comprising an antenna (11) at the ends of which connection pads (12) are provided for connection with an electronic module, characterised in that the method comprises at least one stage consisting in machining a cavity (61) and connection recesses (62) in an upper face of the card body, in such a way that the machining plane of the bottom of the cavity is situated above the plane of the antenna (11) and the connection recesses (62) are situated above the connection pads of the antenna (12), enabling them to be exposed.
6. Manufacturing method according to one of the preceding claims, characterised in that the support sheet (10) is located between the plastic foils so as to form the neutral axis of the card.
7. Manufacturing method according to one of the preceding claims, characterised in that the antenna (11) is produced by incrustation on the support sheet (10).
8. Manufacturing method according to one of the preceding claims, characterised in that the connection pads (12) are produced in a zigzag pattern.
9. Manufacturing method according to one of the preceding claims, characterised in that the machining of the connection recesses (62) is carried out through the connection pads (12) of the antenna (11).
10. Manufacturing method according to one of the preceding claims, characterised in that the connection recesses (62) are diametrically opposite each other and are situated on a mid-perpendicular (65) of the cavity (61).

Cont.
Sub
A1

11. Manufacturing method according to one of the Claims 1 to 8, characterised in that the connection recesses (62) are situated side-by-side and on either side of a mid-perpendicular (65) of the cavity (61).

12. Manufacturing method according to one of the Claims 1 to 10, in which the electronic module (7) [sic] comprises an integrated circuit microchip and a single-sided printed circuit having the flush contact zones defined by the ISO standard, characterised in that the pads providing contact with the antenna are outside the contact zones defined by the ISO standard.

13. Manufacturing method according to one of the Claims 1 to 12, in which the electronic module (M) comprises an integrated circuit microchip and a double-sided printed circuit without conductive paths between the two faces, the double-sided circuit comprising an insulating foil (60) carrying on one face a first set of conductive pads (70) intended to serve as access contacts for the smart card, and on the other face a second set of conductive pads (72) intended to be connected to the antenna, the said pads comprising contact zones located on the same side of the cavity and on either side of a mid-perpendicular of this cavity, or on a mid-perpendicular of the cavity on two opposite sides, the said contact zone being extended by a track with its edge parallel to the electronic module.

14. Manufacturing method according to one of the preceding claims, characterised in that the connection between the connection pads (12) of the antenna (11) and the conductive pads (72) of the module (M) is formed by a solder with a low melting point.

15. Manufacturing method according to Claim 14, characterised in that the ~~solder used comprises an alloy with a basis of indium and tin.~~

Cont.
Sub
A1

16. Manufacturing method according to one of the Claims 14 or 15, characterised in that the solder used comprises not more than 52% by weight of indium and 48% by weight of tin.
17. Manufacturing method according to Claim 14, characterised in that the solder used comprises an alloy with a basis of bismuth, tin and lead.
18. Manufacturing method according to Claim 17, characterised in that the solder used comprises not more than 46% by weight of bismuth, 34% by weight of tin and 20% by weight of lead.
19. Manufacturing method according to Claim 14, characterised in that the solder used comprises an alloy with a basis of bismuth, tin and indium.
20. Manufacturing method according to Claims 19, characterised in that the solder used comprises not more than 57% by weight of bismuth, 26% by weight of indium and 17% by weight of tin.
21. Manufacturing method according to one of the Claims 1 to 13, characterised in that the connection between the connection pads (12) of the antenna (11) and the conductive pads (72) of the module (M) is formed by means of a grease charged with metallic particles.
22. Manufacturing method according to one of the Claims 1 to 13, characterised in that the connection between the connection pads (12) of the antenna (11) and the conductive pads (72) of the module (M) is formed by means of a silicon gasket charged with metallic particles.
23. Manufacturing method according to one of the Claims 1 to 13, characterised in that balls of gold are additionally deposited by thermo-compression on the conductive pads (72) of the module (M) in order to ~~increase the bonding surface between the module and the antenna.~~

Add #2